Does cross-border regulation really influence cross-border trade? Evidence from the Services Trade Restrictions Index

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ABSTRACT

This paper uses the recent Services Trade Restrictions Database and the Services Trade Restrictons Index provided by the World Bank to assess the specific impact of Mode 1 regulation on cross-border services trade. The article follows an augmented gravitational model to evaluate the determinents of imports and exports between country pairs, and to assess their correlation with Mode 1 regulation of both the home country and the partner country. At the aggregated level, there is evidence of a negative correlation between services trade values and the level of restrictions of both the home country and the partner country. The partner country regulation doesn't keep its impact at the sectoral level.

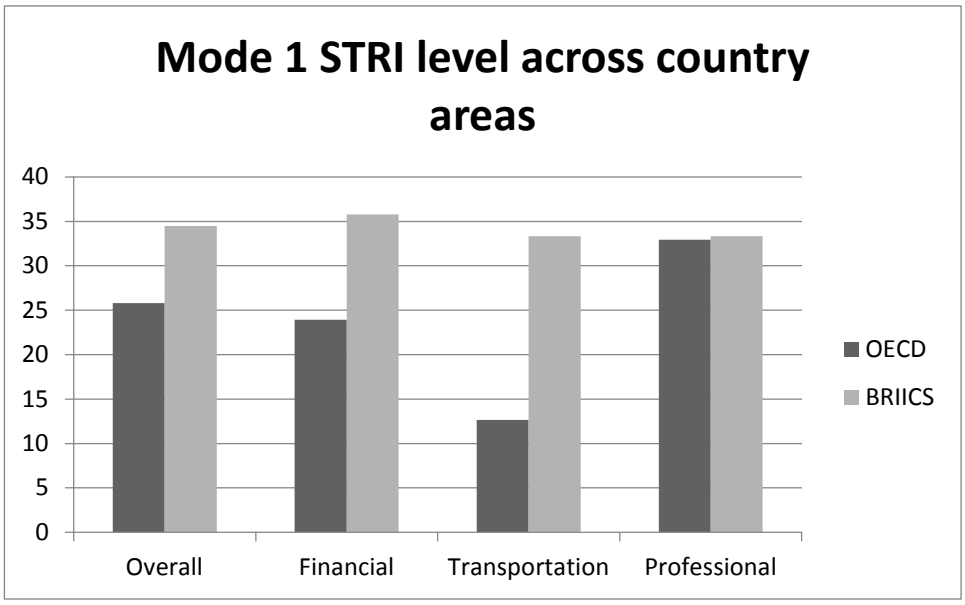
JEL specifications: F10, F14, F20, L51, F80.

1. Introduction

Since the 1970s, international trade in services drastically increased. Nowadays, it represents over 20% of total trade within OECD countries (Lennon, 2011). Studies exploring this theme aroused recently, and much still has to be done to shed light on the various determinants of trade and their differences with trade in goods. In particular, the impact of regulation on trade in services led to recent literature (see below) but very little has been done regarding the impact of cross-border regulation on cross-border trade (imports and exports). Until July 2012 and the creation of the Services Trade Restrictions Index (STRI), it was indeed very difficult to assess the actual impact of cross-border regulation since this regulation had not been specifically measured. The recent creation of the STRI and the Services Trade Restrictions Database (STRD) leads to great potential for further research and recommendations. Firms' decisions to import and export services may indeed depend on the actual regulation faced, but can also depend on the overall regulatory climate of a country. In the later case, the firm's decision depends on the way the partner country is perceived, and the signal sent by the overall regulatory climate of a country may have a stronger impact on firms' decision to trade with another territory, than the actual specific regulation. Assessing the impact of cross-border regulation on cross-border trade appears to have potential major implications on further research.

In order tosolve this issue, this paper uses a simple gravity model framework, using the newly created (STRI) developed in July 2012, and following the framework developed by Kimura & Lee (2006). The goal of the analysis is to isolate the correlation between the regulation on cross-border services and the values of imports and exports.The countries selected are all OECD and BRIICS countries (Brazil, Russia, India, Indonesia, China and South Africa), which cumulated GDP accounts for over 80% of the World GDP (See Annex Table A1). Without being exhaustive, this sample presents the advantage of providing information on the main trends in international trade. Also, it presents a variety of countries across five continents with various regulatory behaviors. For example, BRIICS countries are less open than OECD countries on average, except in the professional sector. Especially, in the transportation sector, the STRI is 2.6 times higher in the BRIICS than in the OECD (See Figure1).

Figure 1: Mode 1 STRI level across country areas



Source: OECD EBOPS2010

Sectors taken into account are the Financial, the Transportation and the Professional sectors, which are the only sectors for which cross-border trade regulation indexes are given by the STRI. The overall cross-country regulation index (all sectors included) is also included.

The analyses are first ran with the log-linear regression method, and corrected through the Poisson Quasi-Maximum Likelihood (PQML) method. They provide clear evidence of a negative correlation between cross-border trade in services and the level of countries' restrictions to services trade. In other words, the more a country is legally open to trade in services, the more it exchanges services with other countries. These results are consistent and resist to robustness checks. However, when analyzing the sectoral level, the magnitude of the correlation differs from home country to partner country and across sectors. The transportation sector provides evidence of a significant correlation between the value of services trade and both home country and partner country regulatory environments. The financial sector provides the same evidence for home country only, while the impact of the regulatory environment for the professional sector appears only in the home country in the case of imports. In any case, endogeneity could not be controlled for and these findings are only providing evidences of a correlation. These evidences should not be misinterpreted for direct causalities.

Since the mid-1980s, the focus of theoretical literature on international trade in services has increased, leading to a variety of studies. In particular, the impact of regulations on trade flows was largely explored, in the past decade. The methodology used to assess the determinants of trade in services and of regulation in particular is the same as the one used for the assessment of the determinants of trade in goods: gravity models appear to provide conclusive results even though trade in services presents specificities in comparison to trade in goods (Mirza & Nicoletti, 2004; Schwellnus, 2007; Lennon, 2011). A strong negative link between regulatory restrictions and the level of trade was found (Van der Marel & Shepherd, 2011). Regulatory measures affect the fixed cost of entering the market as well as the variable costs of servicing that market (Kox & Nordås, 2007). Especially, the impact of regulation differs, depending on the type of services traded (Crozet, Milet, & Mirza, 2013). Overall, the regulatory environment has a potentially stronger impact on trade in services than on trade in goods; cooperation and liberalization may have great spillovers (Francois & Hoekman, 2010).

Furthermore, the analysis of trade in services differs from the analysis of trade in goods by the fact that there are four different modes of trade. The General Agreement on Trade in Services (GATS) defines the following four modes of services: "Cross-border supply is defined to cover services flows [...]; Consumption abroad refers to situations where a service consumer (e.g. tourist or patient) moves into another […] territory to obtain a service; Commercial presence implies that a service supplier […] establishes a territorial presence […] in another […] territory to provide a service […]; and Presence of natural persons consists of persons […] entering [another] territory to supply a service". The economic literature has recently shown interest in the modal approach of trade in services, since this approach has the advantage of providing specific conclusions and having direct policy implications. Using a list of regulatory policy variables, Nordås and Kox (2008) found complementarity between the different modes of services. Regulatory heterogeneity between the different modes also has a strong negative impact on trade in services. Especially, it negativelly affects commercial presence (Mode 3) and drives firms' decisions towards cross-border trade (Mode1). These findings are supported by Christen and Francois (2010) who also emphasize the impact of the market size in the choice of mode. However, until the dissemination of the STRI, there was no index assessing the legal openness of a country to trade in services and studies specifically focusing on modal regulation. Furthermore, to the author's knowledge, no study has yet exclusively focused on the impact of cross-border regulation itself on Mode 1 trade.

Such a study can help specifying if firms' decisions rely on specific measures or on the general regulatory environment of the partner country.

Furthermore, the current article focuses on OECD and BRIICS countries. Besides assessing the impact of cross-border regulations on cross-border trade, it provides a panel of different countries and reviews the regulatory differences between these countries. It was already shown that the least protected countries are the developed countries (Fontagné, Guillin, & Mitaritonna, 2011). Liberalizing their economy, developing and emerging countries with high regulatory bareers could potentially get great gains from more services trade (Mattoo, 2001). However, liberalization encounters strong resistances: historically, industrialized countries are the main exporters of services, and developing/emerging economies fear te results of opening their economies to further services imports (Sapir, 1985; Stern, 2002). Furthermore, trade liberalization could lead to an increase in services exports within the South area. South-South exports represented 10% of world services exports in 2006 (Dihel, Eschenbach, & Shepherd, 2006), and liberalization can potentially lead to great gains for South economies and the BRIICS especially, which dominate this area. There are also strong disparities with country areas. While India is the closest economy of this article's panel, with a Mode 1 STRI of 70.75, South Africa is the most opened (1.8). Even within the European Union, regulation on trade in services is heterogeneous (Kox, Lejour, & Montizaan, 2004) and Mode 1 STRIs vary from 6.09 (Poland) to 37.95 (Hungary). Also, countries are heterogeneous across sectors. The transportation sector is extremely liberalized in the OECD countries and very protected in the BRIICS, whereas BRIICS countries are on average more open in the Professional sector (see Figure 1). Assessing the impact of cross-border regulation on cross-border trade with a specific focus on countries disparities appears to be relevant for further recommendations on policies for potential gains for the different country areas.

Section 2 explores the methodology used to assess the effects of cross-border regulation on trade in services, and presents the data used for the estimates. Results are presented and tested in section 3. Finally, section 4 provides conclusions based on the observations realized, and recommendations towards further studies and policies.

2. The Gravity Model

2.1 Empirical strategy

The gravity equation founded by Tinbergen (1962) has empirically proven to be the most efficient economic tool to assess the impact of the different determinants of trade. Its low theoretical justification led to further research and extensions, and to new models, econometrically exploitable and with theoretical justifications (Anderson, 1979; Bergstrand, 1985; Anderson & Van Wincoop, 2003; Baier & Bergstrand, 2009). In particular, Anderson & Van Wincoop's augmentation of the model appears to be particularly adapted to trade in services, as long as services specificities are taken into account. In particular, trade costs differ: Trade in goods requires physical transportation and depends thus on cross-border goods regulation as well as freight costs. Trade in services, on the other hand, is not subject to physical transportation and depends on specific services regulation (Anderson & Van Wincoop, 2003; Schwellnus, 2007). The determinants of bilateral flows can be decomposed in a standard gravity equation, following Kimura & Lee's model (2006):

$$M_{ij} = G_i^{\beta_1} . G_j^{\beta_2} . D_{ij}^{\beta_3} . R_i^{\beta_4} . R_j^{\beta_5} . E_{ij}., \quad (1)$$

with

M_{ij} = value of imports of country i from country j,

G_i = economic mass of country i,

G_j = economic mass of country j,

D_{ij} = geographic distance between the capitals of country i and country j,

R_i = relative distance of country i,

R_j = relative distance of country j,

E_{ij} = error term.

Thus, the basic gravity equation takes the following form:

$$\ln(M_{ij}) = \beta_1 \ln(\mathrm{gdp_i}) + \beta_2 \ln(gdp_j) + \beta_3 \ln(\mathrm{dist}) + \beta_4 \mathrm{Remoteness_i} + \beta_5 \mathrm{Remoteness_j} + \gamma_i + \gamma_j + \varepsilon_{ij}, \quad (2)$$

with

$\ln(gdp_i)$ = log of GDP of country i,

$\ln(gdp_j)$ = log of GDP of country j,

ln(dist) = log of geographical distance between capital cities of country i and country j,

Remoteness_i = log of relative distance of country i

= ln(dist/GDPshare_i)

with GDPshare_i = share of country i in world GDP,

Remoteness_j = log of relative distance of country j

= ln(dist/GDPsharej)

with GDPshare_j = share of country j in world GDP,

γ_i = country i fixed effects,

γ_j = country j fixed effects

ε_{ij} = random disturbance term.

This first simple equation shows the importance of home country and partner country factors, as well as bilateral factors. It can be augmented with geographic economic and cultural determinents of trade. Moreover, the STRI is introduced to the equation:

$$\ln(M_{ij}) = \beta_1 \ln(\text{gdp}_i) + \beta_2 \ln(gdp_j) + \beta_3 \ln(\text{dist}) + \beta_4 \text{Remoteness}_i + \beta_5 \text{Remoteness}_j + \beta_6 adjacency + \beta_7 com_{lang} + \beta_8 colonial + \beta_9 M1_{i_x} + \beta_{10} M1_{j_x} + \beta_{11} EIA + \varepsilon_{ij}, \quad (3)$$

with

adjacency = dummy for country pairs which share a common border,

com_lang = dummy for country pairs which share an official language,

com_lang = dummy for country pairs sharing a colonial link,

$M1_{ix}$ = value of sector x Mode 1 STRI in country i,

$M1_{j\,x}$= value of sector x Mode 1 STRI in country j,

EIA = dummy for country pairs which are part of a common economic integration agreement.

The empirical analysis is conducted for year 2010 only. Having cross-section data, time fixed effects are absent from the equation. Following Kimura & Lee's approach (2006), GDP and

population are not ran in the same regression in order to avoid multicollinearity. The same applies for country fixed effects. Membership in a free-trade agreement appears to be particularly difficult to implement into the gravity equation. Indeed, 17 countries out of the sample of 32 countries are part of the European Union, and this membership has a direct impact on their openness to trade. However, including a dummy for a membership to a common economic integration agreement helps controlling for the relationship between the home and the partner country.

Zero-values are an important issue in gravity models: some country pairs may lack trade value data, while other country pairs might not exchange, and it is important not to mix these two different phenomena. Log-linear estimations encounter two main caveats: First, log-linear regressions do not take zero-trade flows into account, which biases the results. Second, they over-estimate the impact of geographical distance, colonial link and membership of a free-trade agreement on the value of trade flows (Silva & Tenreyro, 2003). The Poisson Quasi-Maximum Likelihood (PQML) method appears to be the most appropriate to assess the determinants of bilateral trade through a gravity equation (Silva & Tenreyro, 2003; Schwellnus, 2007; Siliverstovs & Schumacher, 2009). However, this does not solve the issue related to missing data, which will be explored later in section 2.

2.2. Variables

The data provided to build the gravity equation used to assess the correlation between Mode 1 regulation and cross-border trade come from different data sources.

2.2.1 Country characteristics

Three different databases provide data for the main determinants of trade (GDP, distance, adjacency, common language, colonial link, regulation and economic integration agreement). First, the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) provides bilateral distance values, and adjacency and language dummy variables for 224 different countries, including all OECD countries and BRIICS (Mayer & Zignago, 2011). Second, the Monetary Fund (IMF)'s World Economic Outlook provides data for country GDP and world GDP values for year 2010, which corresponds to the OECD cross-border services trade database data collection year. GDP values are current prices values, expressed in billions of US Dollars. Since the model focuses

on year 2010 exclusively, current prices values expressed in the common currency are the most appropriate for cross-country comparison. $remoteness_i$ and $remoteness_j$ are computed through these variables. Third, the GATS provide a list of economic membership agreements in services.

2.2.2 Cross-border services trade values

Cross-country services trade values are provided by the OECD Statistics on International Trade in Services by Partner Country. This database provides trade in services imports & exports values for all OECD countries and BRIICS counties. These values are expressed in US Dollars. To the author's best knowledge, this database provides the most accurate and exhaustive data on international trade in services values. 2010 services trade values were perceived as optimal to fit the STRI data collection dates (see below). It is important to notice that values are still missing for a fair amount of country pairs: out of the 1024 observed country pairs, only 608 provide data for imports 614 for exports (See Table 1). Besides lowering the exhaustivity of the observations, this potentially biases the results, since missing values are under most probabilities lower than the average trade values.

2.2.3 Services trade restrictions

The regulation indicator used for the purpose of the analysis is the STRI developed by the World Bank Services. The Services Trade Restrictions Database is the first and today's only attempt to collect mode-specific regulation indexes by country. It provides one index by country, by trade mode and by sector. It aims to measure "policies and regulations that discriminate against foreign service providers, as well as certain key aspects of the overall regulatory environment that have a significant impact on trade in services" and provides an indicator for every sector and sub-sector affected by country regulation. The data are first collected through questionnaires submitted to local firms from every country. Results are then submitted to governments for feedback. Finally, they are processed and harmonized to allow cross-country comparability. Thus, the index is based on the policy information alone and is built through the assignment of an openness value for every sub-indicator (see Annex Table A2) and its weighted aggregation (Borchert, Gootiiz, & Mattoo, Guide to the Services Trade Restrictions Database (Working Paper), 2012). Among three major methods to measure services trade policy (STRI, ordinal ranking of policy combinations, econometric approach), the authors of the STRI chose the first, due to its simplicity, its

transparency and its robustness. They find that it has the weakness of being subjective, but that its assessments of restrictions are similar to those based on the other methods (Borchert, Gootiiz, & Mattoo, Policy Barriers to International Trade in Services: Evidence from a New Database, 2012). Such an approach also has the advantage of enabling gravity models: the construction of the STRI doesn't take trade values into account and this instrument can be incorporated into a gravity equation. The reverse causality issue between trade in services and the regulatory environment of trading countries always remains a challenge since openness to trade is a cause as well as a consequence of trade flows. However, the STRI limits this caveat, and correlations between services trade values and the STRI can reasonably be established. The STRI is computed for 103 countries, including 26 OECD-countries and the 6 BRIICS countries. The data were collected between 2008 and 2011. Each country's STRI provides Most Favored Nation trade restrictions level, except in the case of European Union countries, where the STRI designs the level of restrictions within the European Union. An "EU-20" country is added, and provides the STRI adopted by European Union countries towards non-European Union countries (Borchert, Gootiiz, & Mattoo, Guide to the Services Trade Restrictions Database (Working Paper), 2012). The current study takes EU-membership into account to determine bilateral level of restrictions. However, some country-specificities could not be assessed and membership to a common economic integration agreement is used as a tool to control for the lack of specification of the index. It is noticeable that most countries have an homogeneous regulatory environment across sectors, but seven countries report total openness to transportation (Chile, China, Indonesia, Mexico, New Zealand, Russia & South Africa). A summary of all regulation indexes is reported in Annex Figures A1 to A4.

2.2.4 More on variables

Considering the data availability, this paper focuses on 2010 cross-border trade in services in 26 OECD countries and the 6 BRIICS countries. For the full list of countries covered, please see Annex Table A3. The services sectors nomenclature differing between the STRD and the OECD databases, logical linkages were produced to fit sectors. Mode 1 trade is not applicable to every sector, and this paper focuses on sectors considered tradable by the STRI, i.e. Financial (all sub-sectors), Transportation (Maritime Shipping International only) and Professional (Accounting and Auditing and Legal Advice Foreign Law). Although the sub-sector specificities are taken into

account to determine linkages between the OECD database and the STRD, the analysis focuses on sectors only (Overall, Transportation and Professional) in order to use a larger sample and to facilitate economic interpretation. For the full list of sectors and sub-sectors covered and the link assessed between the OECD database and the STRD, please see Annex Table A4. Table 1 summarizes data used in the analyses.

Table 1: Variables summary

Variable	Obs	Mean	Std. Dev.	Min	Max
lgdp_i	1024	6.76291	1.210923	4.785748	9.590431
lgdp_j	1024	6.76291	1.210923	4.785748	9.590431
lgdp_cap_i	1024	10.03411	.6524017	8.09881	10.76071
lgdp_cap_j	1024	10.03411	.6524017	8.09881	10.76071
lgdp_world~i	1024	.1575414	1.21003	-1.814005	3.006573
lgdp_world~j	1024	.1575414	1.21003	-1.814005	3.006573
lpop_i	1024	3.641019	1.500252	1.476135	7.201104
lpop_j	1024	3.641019	1.500252	1.476135	7.201104
ldist	1024	8.362873	1.187645	4.226026	9.88258
Adjacency	1024	.0488281	.2156139	0	1
com_lang	1024	.078125	.2684993	0	1
Colonial	1024	.0410156	.1984233	0	1
remotenessi	1024	-3.915244	1.79883	-8.092954	1.542058
remotenessj	1024	-3.915244	1.79883	-8.092954	1.542058
eia	1024	.3212891	.4671997	0	1
total_imports	608	2400.082	5313.201	.264956	52349.15
total_exports	614	2684.701	5933.797	1.721054	51029
financial_imports	537	129.5148	578.7582	0	9812
financial_exports	552	178.811	800.7412	0	12974
transportation_imports	538	313.6721	709.5164	0	6249.605
transportation_exports	538	408.0954	1130.302	0	14678.2
professional_imports	505	84.56744	292.8038	0	3646
professional_exports	503	77.24359	221.6077	0	2611
ltotal_imports	608	6.323747	1.881774	-1.328192	10.86569
ltotal_exports	614	6.53097	1.788543	.5429369	10.84015
lfinancial_imports	503	2.450949	2.336935	-10.07784	9.191361
lfinancial_exports	512	2.598827	2.289309	-3.518833	9.470702
ltransportation_imports	494	4.039223	2.267065	-3.880621	8.740273
ltransportation_exports	469	3.979356	2.561914	-2.282979	9.594118
lprofessional_imports	464	2.55695	2.206933	-7.002066	8.201385
lprofessional_exports	446	2.620246	2.100303	-3.86533	7.867488
M1i_Overall	1024	27.43843	14.42639	1.8	70.75
M1i_Financial	1024	26.15655	16.85278	0	71.77
M1i_Transportation	1024	16.54053	13.1955	0	50
M1i_Professional	1024	33.00859	27.44638	0	100

M1j_Overall	1024	27.43843	14.42639	1.8	70.75
M1j_Financial	1024	26.15655	16.85278	0	71.77
M1j_Transportation	1024	16.54053	13.1955	0	50
M1j_Professional	1024	33.00859	27.44638	0	100

3. Estimations results

3.1 Estimated results

Table 2 and 3 show the estimated results for imports and exports, respectively. Both tables are divided in two sections: OLS regressions and PQML regressions. Let's first analyse the results provided in Table 2. The first column provides results for a linear regression. The absence of significativity of countries' GDP is explained by three factors. First, the country selection provides data for countries with high GDPs, and the disparity of the countries' GDPs is relatively small. Second, the analysis does not take country fixed effects into account. Distance and remoteness variables are also not significant, due to the presence of a dummy for economics integration agreement, which is correlated with these variables. However, this does not affect the coefficient of the regulation index. Sharing a common language, a colonial link or the membership to an economic integration agreement is positively correlated to the values of trade, as expected. Sharing a common border appears to be negatively correlated with the values of trade. This result is contradictory with former studies which find that common border has a positive correlation with trade in services. Finally, a closed regulatory environment (high STRI) appears to have a low but significant negative correlation with the value of trade. In column (2), the regression is ran with te PQML method. The significativity of the GDPs of both home and partner country is restored, as well as both countries' remoteness. Also, sharing a common border looses its significativity, which resolves partially the paradox of the log-linear regression. As expected, the value of the coefficient of colonial link decreases. Finally, the impact of regulation is confirmed: the more closed a country is, the less it trades.

Table 2: Determinants of services imports

	(1) OLS	(2) Poisson Quasi-Maximum Likelihood
lgdp_i	3.357	8.697**
	(2.803)	(3.643)
lgdp_j	-4.436	-10.80***
	(2.782)	(3.327)
ldist	-3.507	-4.054
	(4.076)	(4.988)
remotenessi	2.532	7.988**
	(2.792)	(3.614)
remotenessj	-5.287*	-11.56***
	(2.778)	(3.340)
adjacency	-0.268*	-0.199
	(0.139)	(0.135)
com_lang	0.818***	0.480**
	(0.170)	(0.221)
colonial	0.677***	0.329*
	(0.134)	(0.186)
i_m1r	-0.0185***	-0.0116*
	(0.00496)	(0.00637)
j_m1r	-0.0116***	-0.00847**
	(0.00349)	(0.00364)
Eia	0.699***	0.413***
	(0.132)	(0.143)
Constant	32.51	41.38
	(45.72)	(55.99)
Observations	608	608
R-squared	0.720	

Note: For column (1), estimates are made using the the log-linear regression method, the explained variable is ln(total_imports). For column (2), estimates are made using the Poisson Quasi-Maximum Likelihood method, the explained variable is total_imports. Estimates are made without home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and i_m1r and j_m1r are the actual index values. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.

Table 3 describe the regression ran on the value of services exports, using the same method as in Table 2. In the first column, the only significant variables are com_lang, colonial and partner country regulation. The PQML method corrects the results and provides evidence of a negative correlation betwenn trade restrictiveness and exports for both the home country and the partner country. The results obtained confirm the expectations of the analysis: cross-border regulations are highly correlated with trade in services, both for imports and exports.

Table 3: Determinants of services exports

	(1) OLS	(2) Poisson Quasi-Maximum Likelihood
lgdp_i	0.421	0.820
	(2.995)	(3.435)
lgdp_j	0.881	-2.805
	(3.230)	(3.339)
ldist	-0.774	-3.836
	(4.662)	(4.761)
remotenessi	-0.291	0.110
	(2.987)	(3.419)
remotenessj	0.0485	-3.536
	(3.221)	(3.352)
adjacency	-0.101	-0.175
	(0.146)	(0.139)
com_lang	1.066***	0.480***
	(0.149)	(0.151)
colonial	0.664***	0.570***
	(0.134)	(0.163)
i_m1r	-0.00467	-0.0122**
	(0.00503)	(0.00615)
j_m1r	-0.0154***	-0.00961***
	(0.00384)	(0.00345)
eia	1.018***	0.633***
	(0.123)	(0.127)
Constant	3.169	39.40
	(52.31)	(53.35)
Observations	614	614
R-squared	0.647	

Note: For column (1), estimates are made using the the log-linear regression method, the explained variable is ln(total_exports). For column (2), estimates are made using the Poisson Quasi-Maximum Likelihood method, the explained variable is total_exports. Estimates are made without home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and i_m1r and j_m1r are the actual index values. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.

For further precision, analyses were ran on all sectors for which the STRI specific to this sector was available: Financial,Transportation and Professional sectors. Table 4 and 5 present the resuts of PQML estimates on imports and exports, respectively. The correlation between the home country's regulatory environment and its level of trade is verified in all sectors except for professional exports. However, a clear distinction can be made between the effect of the home country and regulation and the effect of the partner country regulation. For both imports and exports flows, the partner country's regulatory environment only affects the transportation sector, whereas financial and professional sectors seem to be insensitive to it. These results are subject to

caution. Imports data are missing for 416 country pairs, and exports data for 410. Moreover, the scarcity of sectoral data leads to a much smaller sample than at the aggregated level. In particular, the professional sector estimates rely on 505 data points for imports, and 503 data points for exports. Also, 7 countries out of the 32 selected have a zero-value for professional regulation, whereas no more than 1 country have such low values in all other sectors. This singularity of the professional sector may affect the coefficients and lead to an underestimation of the impact of the regulation on trade.

Table 4: Determinants of services imports (Sectors: Financial, Trasnportation, Professional)

	(1) Financial	(2) Transportation	(3) Professional
lgdp_i	-12.15	8.005	40.46***
	(10.77)	(9.588)	(5.174)
lgdp_j	-31.09**	-1.265	-18.47***
	(12.94)	(6.460)	(5.321)
ldist	-45.40***	5.190	19.38***
	(14.86)	(13.27)	(6.293)
remotenessi	-12.83	7.581	39.67***
	(10.70)	(9.557)	(5.160)
remotenessj	-31.93**	-2.025	-19.55***
	(12.88)	(6.460)	(5.336)
adjacency	-0.982*	-0.0141	-0.220
	(0.527)	(0.285)	(0.175)
com_lang	1.580***	-0.241	0.520**
	(0.363)	(0.239)	(0.216)
colonial	0.424	0.0529	0.417*
	(0.476)	(0.259)	(0.236)
i_m1r_financial	-0.0592***		
	(0.0179)		
j_m1r_financial	-0.00400		
	(0.00956)		
eia	-0.534		
	(0.533)		
i_m1r_transportation		-0.0365***	
		(0.00683)	
j_m1r_transportation		-0.0194***	
		(0.00650)	
eia		-0.319	
		(0.299)	
i_m1r_professional			0.0112***
			(0.00375)
j_m1r_professional			-0.00275
			(0.00260)
eia			1.013***
			(0.213)
Constant	502.0***	-61.15	-229.9***
	(167.3)	(148.8)	(70.58)
Observations	537	538	505

Note: All estimates are made using the Poisson Quasi-Maximum Likelihood method. In column (1), the explained variable is financial_imports. In column (2), the explained variable is transportation_imports. In column (3), the explained variable is personal_imports. Estimates are made without home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and i_m1r_financial, j_m1r_financial, i_m1r_transportation, j_m1r_transportation, i_m1r_professional and j_m1r_professional are the actual index values. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.

Table 5: Determinants of services exports (Sectors: Financial, Trasnportation, Professional)

	(1) Financial	(2) Transportation	(3) Professional
lgdp_i	-17.63	8.991	28.25***
	(11.04)	(14.91)	(5.967)
lgdp_j	-23.90***	-9.309	-18.29***
	(8.960)	(7.269)	(4.552)
ldist	-43.54***	-1.629	7.481
	(14.29)	(19.77)	(7.101)
remotenessi	-18.47*	8.738	27.44***
	(10.94)	(14.85)	(5.972)
remotenessj	-24.71***	-10.06	-19.24***
	(8.932)	(7.299)	(4.568)
adjacency	-0.360	-0.0397	-0.616***
	(0.498)	(0.294)	(0.223)
com_lang	1.283***	0.0431	0.701***
	(0.273)	(0.333)	(0.204)
colonial	0.625	0.227	0.580**
	(0.415)	(0.328)	(0.232)
i_m1r_financial	-0.0465***		
	(0.0139)		
j_m1r_financial	-0.00658		
	(0.00865)		
i_m1r_transportation		-0.0323***	
		(0.00682)	
j_m1r_transportation		-0.0179***	
		(0.00692)	
i_m1r_professional			0.000697
			(0.00348)
j_m1r_professional			-0.000568
			(0.00288)
eia	0.239	-0.312	0.859***
	(0.358)	(0.368)	(0.217)
Constant	480.7***	16.88	-95.01
	(161.0)	(221.8)	(79.45)
Observations	552	538	503

Note: All estimates are made using the Poisson Quasi-Maximum Likelihood method. In column (1), the explained variable is financial_exports. In column (2), the explained variable is transportation_exports. In column (3), the explained variable is personal_exports. Estimates are made without home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and i_m1r_financial, j_m1r_financial, i_m1r_transportation, j_m1r_transportation, i_m1r_professional and j_m1r_professional are the actual index values. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.

3.2 Robustness checks

In order to avoid multicollinearity, the gravity model used did not take country fixed effects into account. In order to check the robustness of the results found, a new analysis is run, including home country fixed effects. In order to confront the collinearity issue, all variables depending on both home and partner country are merged by being summed together.

Thus, the following equation applies:

$$\ln(M_{ij}) = \beta_1 \text{lgdp} + \beta_2 \ln(\text{dist}) + \beta_3 Remoteness + \beta_4 adjacency + \beta_5 com\_lang + \beta_6 colonial + \beta_7 M1_x + \beta_8 EIA + \gamma_i + \varepsilon_{ij},$$

with

$\text{lgdp} = \ln(gdp_i) + \ln(gdp_j)$,

$\text{Remoteness} = \text{remoteness}_i + \text{remoteness}_j$,

$M1_i\_x = M1_i\_x + M1_j\_y$.

The estimated results are reported in the Annex, in Tables A5 and A6. The formerly obtained results hold. In fact, results are as significant or more significant than in the former analyses.

4. Concluding remarks

Among the different determinants of trade in services, regulation plays a major role. In particular, cross-border trade is clearly affected by cross-border regulation. Measuring this effect is difficult since unresolved issues remain. First, there is a potential reverse causality between cross-border regulation and cross-border trade, even though the index used in this study limits the issue. Second, the scarcity of data may have led to biased results, at the aggregated level and at the sectoral level. However, a strong link between cross-border regulation and cross-border trade appears. At the aggregated level, imports and exports are affected by both the home country and the partner country's regulation. The financial sector shows a sensitivity to home country's regulation only. The transportation sector is sensitive to both the home and the partner country's regulation, for both imports and exports. Finally, the professional sector is sensitive to home country regulation only, for imports exclusively. The coefficients found are significant but low,

which asks the question of the actual impact of specific cross-border regulation on cross-border trade. If firms react more to overall regulation than to cross-border regulation, this could potentially mean that the effects of a regulation reside more in the signal it sends to potential exports and importers than in the actual bareers built by the legislation. Further research, comparing the impact on cross-border trade of both cross-border specific regulation and overall regulation, could provide elements for policy recommendations. Assessing the complementarity between overall regulation and cross-border regulation can indeed provide evidence on the signals firms react to. This could lead to different types of policy recommendations, and impact the effect of new policies. In particular, openness-oriented policies could benefit from such research. Furthermore, the results highlighted in this article tend to encourage openness regulatory measures. Indeed, there is a strong heterogeneity of regulation across countries, and the most closed countries could gain greatly from liberalization. This applies for emerging countries in particular, since OECD countries remain nowadays the main exporters of services. In the context of an increase in the services trade worldwide, emerging countries might gain much from liberalization, both by becoming the leading trade exporters of their geographic area, but also by catching up on OECD countries.

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Annex

Table A1: GDP World Share

Cumulated GDP World Share (%)	**2010**
OECD countries	54.5
BRIICS countries	26.6
Total	81.1

Source: IMF World Economic Outlook 2013

Table A2: Key restrictions and STRI scores for Brazil

Overall policy description	Key restrictions	5-point scale
Open without restrictions	"Entry is allowed through a subsidiary and/or branches. Authorization is required." (*Automobile insurance – mode 3*)	0
Virtually open	"Cross-border deposit taking is allowed subject to approval and registration." (*Bank deposit acceptance – mode 1*)	25
Existence of major/non-trivial restrictions	"Residency is required. There is an education requirement; foreign degrees may be accepted. There is a quota for intra-corporate transferees and independent professionals: at least two thirds of employees of a firm must be Brazilians. The duration of stay initially allowed is 90 days to two years, depending on visa type. Extensions are possible, depending on the type of visa, but usually only once. Foreign-licensed professionals are subject to labor market test and economic needs test. There is a minimum wage/wage parity requirement." (*Auditing – mode 4*)	50
Virtually closed	"The limit on foreign ownership is 20 percent of voting capital, and there is no limit on foreign ownership of non-voting capital. Firms with 3 or more employees are required to employ Brazilian nationals to fill at least two-thirds of their positions." (*International air passenger transportation – mode 3*)	75
Completely closed	"Cross-border provision of services not allowed. Must be established as a local office and headquarter and must be properly registered with local professional association." (*Accounting – mode 1*)	100

Notes: As is apparent from the examples shown, most subsector-mode combinations are characterized by multiple provisions, in which case the regime assignment reflects the overall restrictiveness of all applicable measures.

Source: "Guide to the Services Trade Restrictions Database" Working Paper, Borchert, I., Gootiiz, B., Mattoo, A., *The World Bank Development Research Group*, 2012.

Table A3: List of countries

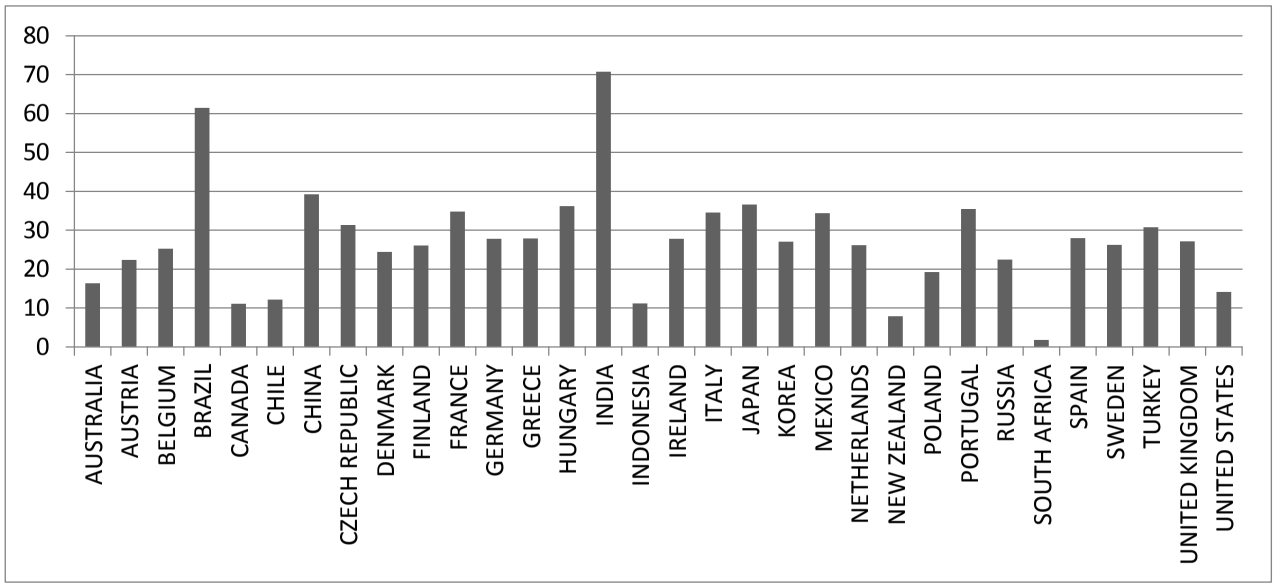
Region	**Country**
High Income OECD	Australia
High Income OECD	Austria
High Income OECD	Belgium

BRIICS	Brazil
High Income OECD	Canada
High Income OECD	Chile
BRIICS	China
High Income OECD	Czech Republic
High Income OECD	Denmark
High Income OECD	Finland
High Income OECD	France
High Income OECD	Germany
High Income OECD	Greece
High Income OECD	Hungary
BRIICS	India
BRIICS	Indonesia
High Income OECD	Ireland
High Income OECD	Italy
High Income OECD	Japan
High Income OECD	Korea
High Income OECD	Mexico
High Income OECD	Netherlands
High Income OECD	New Zealand
High Income OECD	Poland
High Income OECD	Portugal
BRIICS	Russia
BRIICS	South Africa
High Income OECD	Spain
High Income OECD	Sweden
High Income OECD	Turkey
High Income OECD	United Kingdom
High Income OECD	United States

Table A4: Sector linkage between STRI and OECD Databases

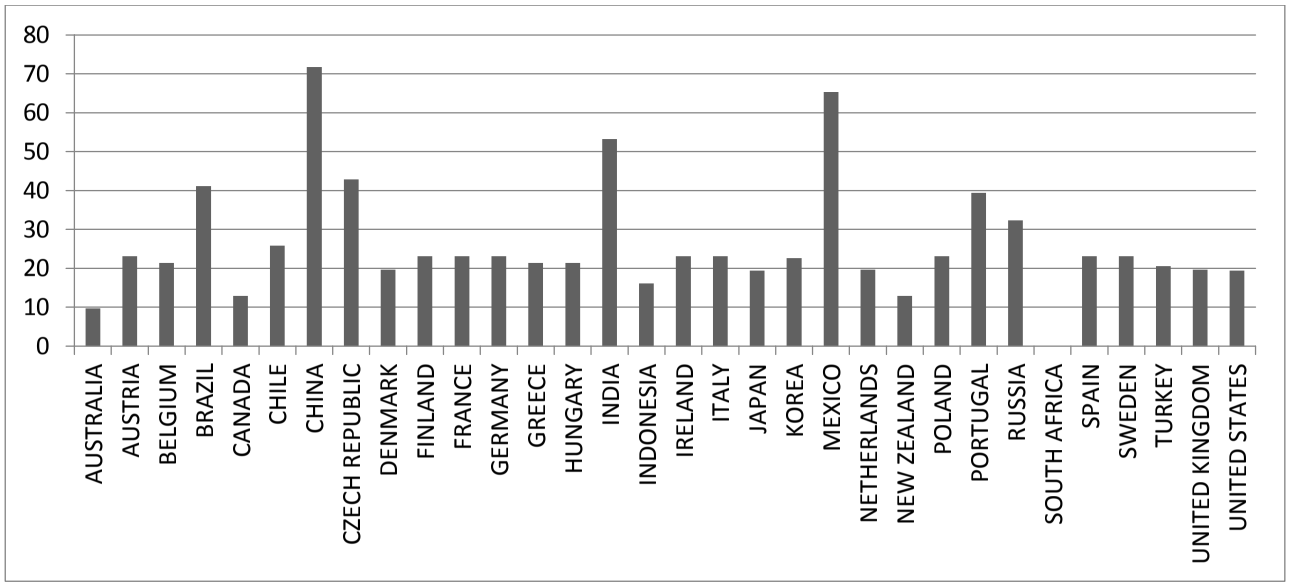
STRI Sector	**STRI Sub-Sector**	**OECD Sector**
Overall		Total Services
Financial	Banking	Financial Services
Financial	Insurance	Insurance Services
Transportation	Maritime Shipping International	Sea transport
Transportation	Maritime Shipping International	Sea transport, passenger
Transportation	Maritime Shipping International	Sea transport, freight
Transportation	Maritime Shipping International	Sea transport, other
Transportation	Maritime Shipping International	Sea freight
Professional	Accounting and Auditing	Accounting, auditing, book-keeping and tax consulting services
Professional	Legal	Legal, accounting, management consulting and public relations services
Professional	Legal	Legal services

Figure A1: Mode 1 overall regulation by country



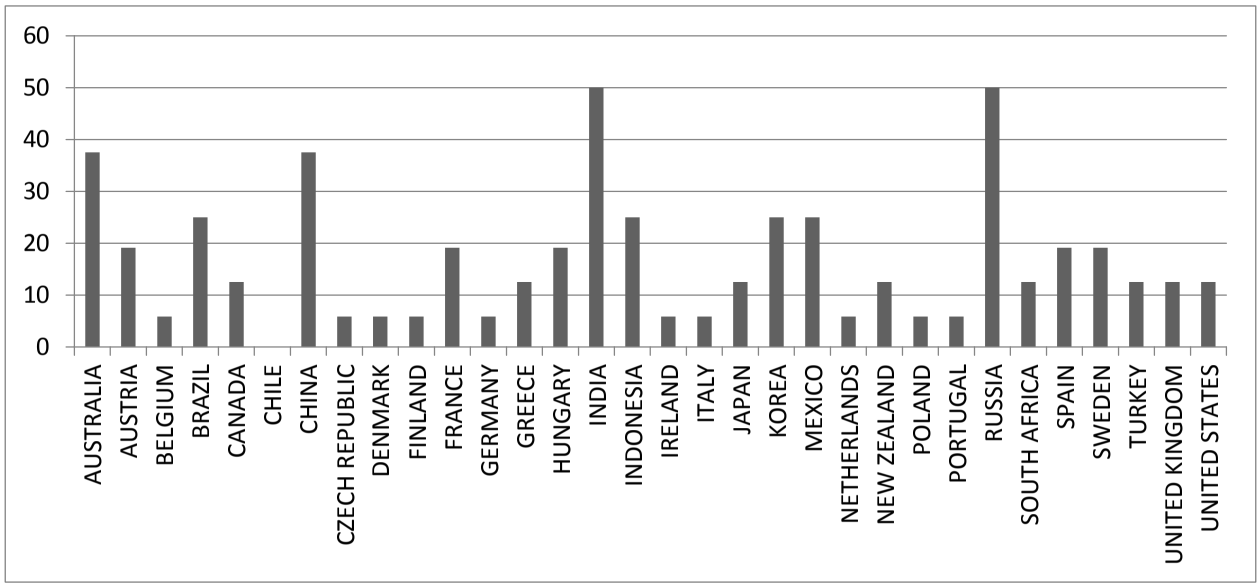
Source: Services Trade Restrictions Database

Figure A2: Mode 1 financial regulation by country



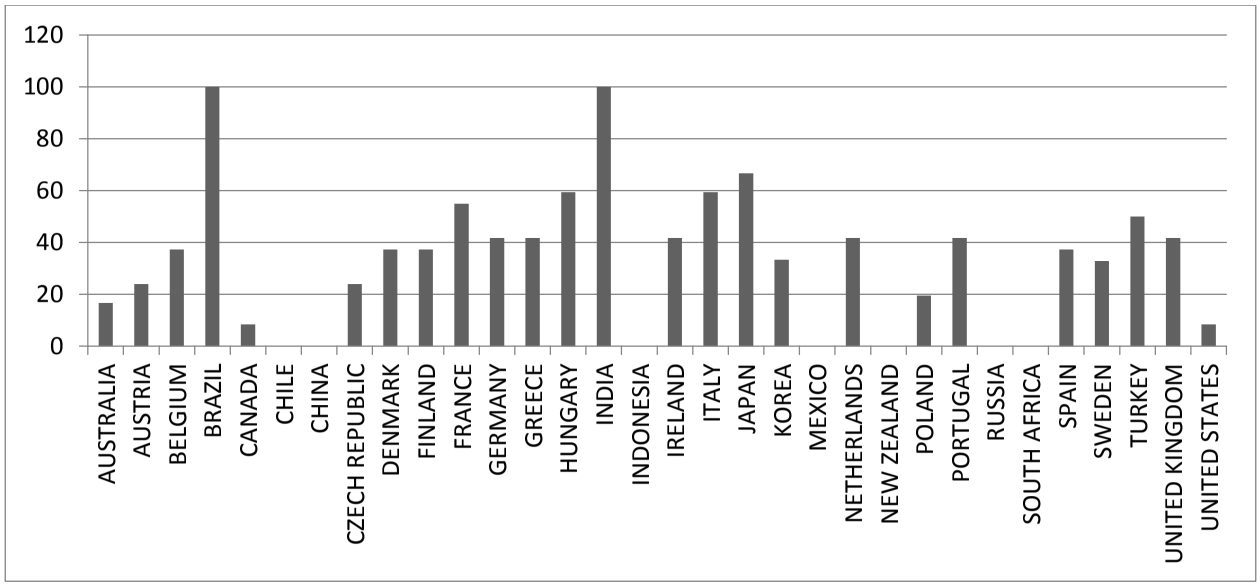
Source: Services Trade Restrictions Database

Figure A3: Mode 1 transportation regulation by country



Source: Services Trade Restrictions Database

Figure A4: Mode 1 professional regulation by country



Source: Services Trade Restrictions Database

Table A5: Determinants of services imports and exports

	(1) Imports	(2) Exports
lgdp	-11.31***	-4.793
	(3.474)	(3.202)
ldist	-24.67***	-11.56*
	(6.962)	(6.410)
remoteness	-12.10***	-5.563*
	(3.477)	(3.198)
adjacency	-0.110	-0.00884
	(0.138)	(0.127)
com_lang	0.361*	0.345**
	(0.191)	(0.163)
colonial	0.276	0.455***
	(0.177)	(0.166)
m1r	-0.0120***	-0.0120***
	(0.00350)	(0.00318)
eia	0.396***	0.502***
	(0.143)	(0.117)
Constant	271.3***	125.3*
	(77.85)	(71.83)
Observations	608	614

Note: All estimates are made using the Poisson Quasi-Maximum Likelihood method. In column (1), the explained variable is total_imports. In column (2), the explained variable is total_exports. Estimates are made with home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and m1r is the the actual index value. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.

Table A6: Determinants of services imports and exports (Sectors: Financial, Transportation, Professional)

	(1) financial Imports	(2) Financial Exports	(3) Transportation Imports	(4) Trasnportation Exports	(5) Professional Imports	(6) Professional Exports
lgdp	-21.22*	-19.65***	-1.434	-9.190**	-17.62***	-19.85***
	(11.30)	(6.525)	(4.869)	(4.525)	(4.134)	(4.205)
ldist	-44.91**	-41.46***	-4.823	-20.16**	-38.00***	-42.20***
	(22.40)	(13.00)	(9.729)	(9.059)	(8.238)	(8.404)
remoteness	-22.04**	-20.45***	-2.205	-9.959**	-18.66***	-20.74***
	(11.20)	(6.483)	(4.860)	(4.530)	(4.120)	(4.203)
adjacency	-1.410***	-0.767**	-0.0288	0.0876	-0.228	-0.560***
	(0.392)	(0.328)	(0.203)	(0.221)	(0.174)	(0.216)
com_lang	1.151***	0.621**	0.0697	0.676**	0.520***	0.479**
	(0.318)	(0.255)	(0.239)	(0.271)	(0.191)	(0.223)
colonial	0.498	0.497*	-0.120	-0.127	0.239	0.454*
	(0.350)	(0.271)	(0.298)	(0.337)	(0.264)	(0.249)
m1r_financial	-0.0196**	-0.0146**				
	(0.00962)	(0.00625)				
m1r_transportation			-0.0195***	-0.0155***		
			(0.00469)	(0.00521)		
m1r_professional					-0.00334*	-0.000963
					(0.00187)	(0.00238)
eia	-0.299	0.265	-0.339	-0.103	0.809***	0.509**
	(0.467)	(0.270)	(0.274)	(0.301)	(0.211)	(0.231)
Constant	494.8**	457.6***	47.10	217.2**	409.9***	460.9***
	(252.1)	(146.2)	(109.1)	(101.4)	(92.58)	(94.21)
Observations	537	552	538	538	505	503

Note: All estimates are made using the Poisson Quasi-Maximum Likelihood method. In column (1), the explained variable is financial_imports. In column (2), the explained variable is financial_exports. In column (3), the explained variable is transportation_imports. In column (4), the explained variable is transportation_exports. In column (5), the explained variable is professional_imports. In column (6), the explained variable is professional_exports. Estimates are made with home country fixed effects model. GDP values are in logarithms, adjacency, com_lang , colonial and eia are dummies, and m1r is the the actual index value. Standard errors are shown in parentheses. ***, **, and * denote 1, 5, and 10 percent level of significance, respectively.